Marine Life Protection Act Initiative

Science Guidelines for Marine Protected Area Planning

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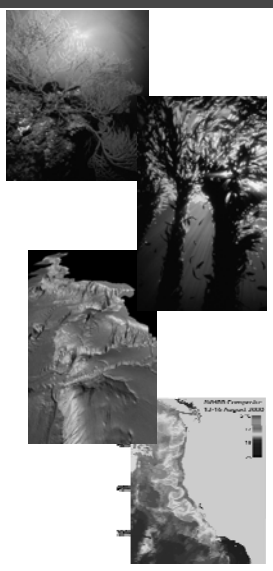
Marine Life Protection Act Goals

1. Protect **natural diversity** and **ecosystem functions**.
2. Sustain and restore marine life **populations**.
3. Improve recreational, educational, and study **opportunities**.
4. Protect representative and unique **habitats**.
5. Clear objectives, effective management, adequate enforcement, sound science.
6. Ensure that MPAs are designed and managed as **a network**.



Goals for Habitats and Ecosystems

1. Protect **natural diversity** and **ecosystem functions**.
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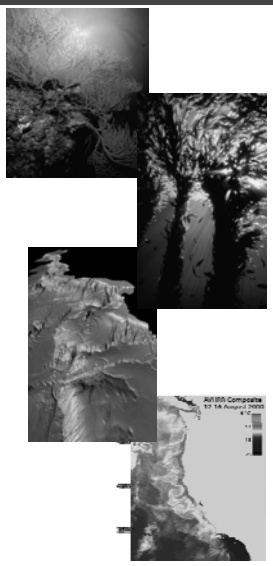
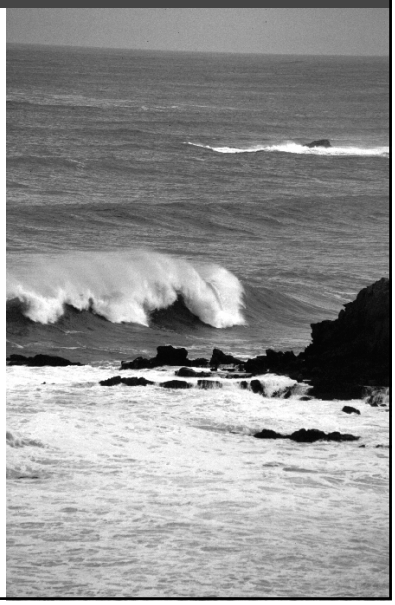


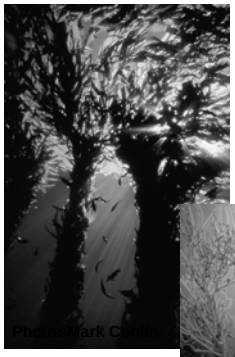
Habitat Representation (Goals 1 and 4)

- For an objective of protecting key and unique marine habitats and to include a range of species likely to benefit, MPAs should extend from intertidal to offshore areas



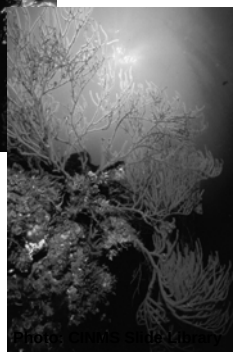
Habitat Representation (Goals 1 and 4)

- For an objective of protecting the diversity of species that live in different habitats and those that move among different habitats over their lifetime, every "key" marine habitat should be represented in the MPA network.



Cruz

Monterey



Key Marine Habitats

Marine Habitats

- Intertidal zones
- Estuaries
- Rocky reefs
- Sandy/soft ocean bottoms
- Underwater pinnacles
- Submarine canyons

Depth Zones

- Intertidal
- Intertidal to 30 meters
- 30 to 100 meters
- 100 to 200 meters
- 200 meters and deeper

Biogenic Habitats

- Kelp forests
- Seagrass beds

Oceanographic Habitats

- Upwelling areas
- Freshwater plumes
- Retention zones

Unique Marine Habitats

- Surfgrass beds
- Eelgrass beds
- Oil seeps and shallow hydrothermal vents
- Elk kelp beds


Photo: Stanford University Slide Library

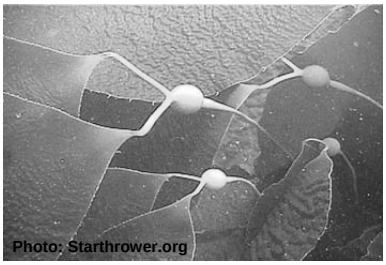


Photo: Starthrower.org


Photo: Ocean Imaging

Habitat Replication (Goals 1 and 4)

- Protect each habitat type in three to five MPAs within each biogeographic region
- Set aside enough habitat in each MPA to include 90% of biodiversity for that habitat

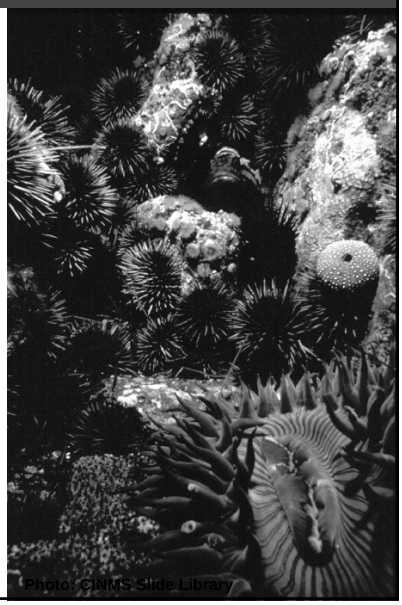


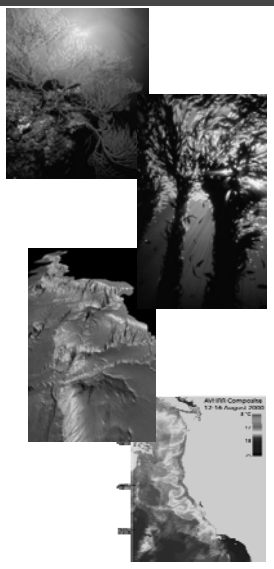
Photo: CINMS Slide Library

Habitat Representation

Habitat	Representation needed to encompass 90% of biodiversity	Data Source
Rocky Intertidal	~0.5 linear miles	PISCO Biodiversity
Shallow Rocky Reefs/Kelp Forests (0-30 M)	~1 linear mile	PISCO Subtidal
30-100m Rocky Reefs	~0.30 square miles	Love surveys
100-200m Rocky Reefs	~0.28 square miles	Love surveys
Sandy Beaches	~1 linear mile	
Sandy Habitat (0-30 M)	~1 linear mile	Based on shallow rocky reefs
Sandy Habitat (30-100 M)	~10 square miles	NMFS triennial trawl surveys 1977-2007
Estuary	~0.12 square miles	SONGS mitigation team surveys

MLPA Goals: Populations

1. To protect the natural diversity and function of **marine ecosystems**.
2. To help sustain and restore **marine life populations**.
3. To improve **recreational, educational, and study opportunities** in areas with minimal human disturbance.
4. To protect representative and unique **marine life habitats**.
5. Clear objectives, effective management, adequate enforcement, sound science.
6. To ensure that MPAs are designed and managed as **a network**.



Size and Spacing (Goals 2 and 6)

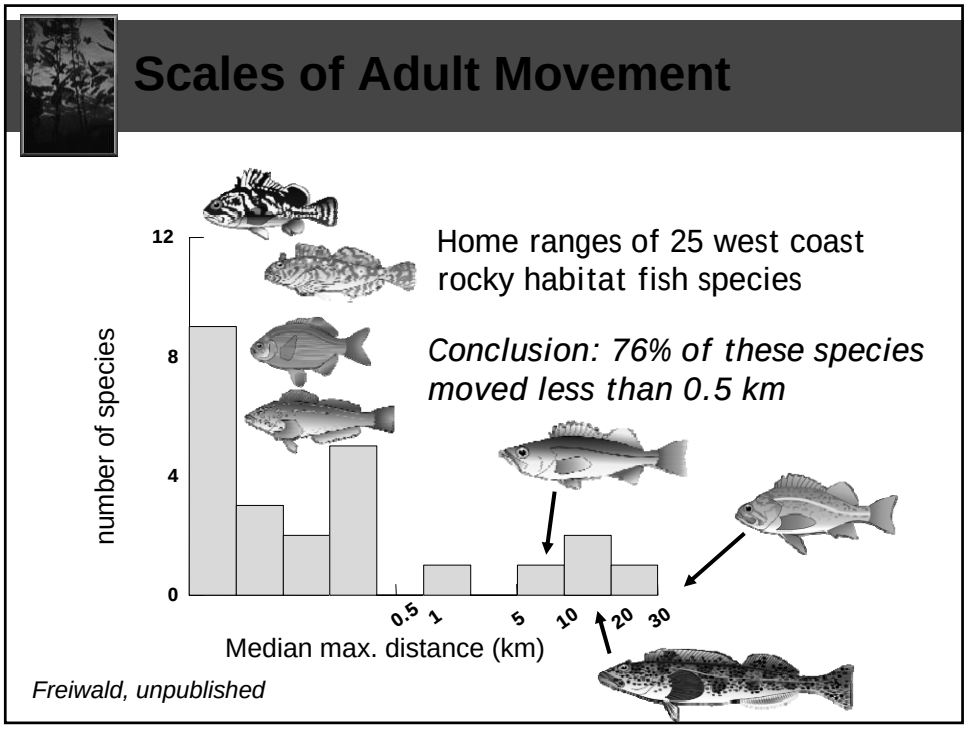
- Are proposed MPAs large enough to encompass adult movements for a range of species?
- Are proposed MPAs close enough together so that larvae can move from one MPA to another?

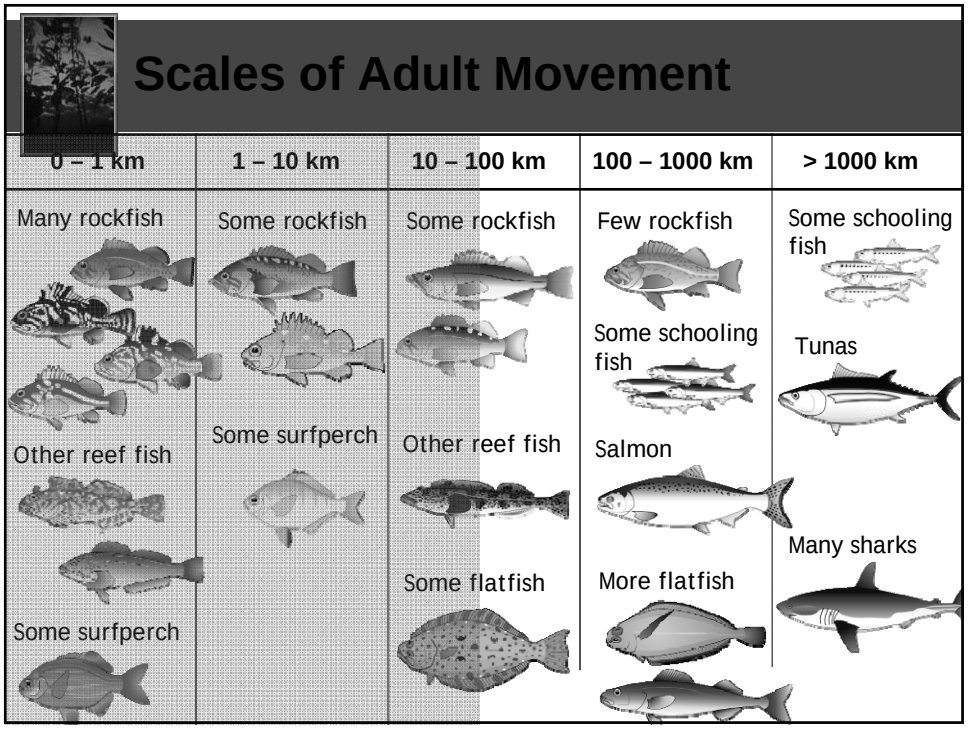
Photo Credit: Claire Fackler/NOAA

Guideline for Alongshore Span of MPAs

- For an objective of protecting adult populations, based on adult neighborhood sizes and movement patterns, MPAs should have an alongshore span of 5-10 kilometers (3-6 miles) of coastline, and preferably 10-20 kolometers (6-12.5 miles). Larger MPAs would be required to fully protect marine birds, mammals, and migratory fish.

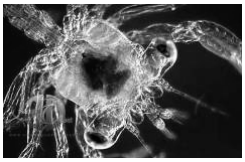
Photo Credit: iStockphoto/Amanda Cotton


Scales of Adult Movement
Home ranges of 25 west coast rocky habitat fish species
Conclusion: 76% of these species moved less than 0.5 km
number of species
12
8
4
0
0.5
1
5
10
20
30
Median max. distance (km)
Freiwald, unpublished

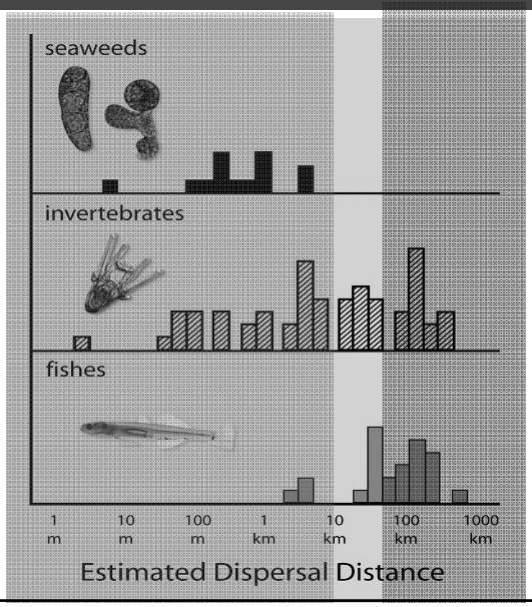

Scales of Adult Movement
0 – 1 km
1 – 10 km
10 – 100 km
100 – 1000 km
> 1000 km
Many rockfish
Other reef fish
Some surfperch
Some rockfish
Some surfperch
Some rockfish
Other reef fish
Some flatfish
Few rockfish
Some schooling fish
Salmon
More flatfish
Some schooling fish
Tunas
Many sharks

Guideline for MPA Spacing

- For an objective of facilitating dispersal of important bottom-dwelling fish and invertebrate groups among MPAs, based on currently known scales of larval dispersal, MPAs should be placed within 50-100 kilometers (31-62 miles) of each other.



Scales of Larval Dispersal



Recommended spacing:

50-100 kilometers

Palumbi 2003
Kinlan and Gaines 2003

Marine Birds and Mammals (Goal 2)

- Include breeding and resting areas for marine birds and mammals within MPAs
- Include foraging areas within MPAs

Photo Credit: iStockphoto/Robert Deal

Science Guidelines for MPA Design

- **No single optimum network design**
- **Include:** **all bioregions**
  all 'key' marine habitats
- **Extent:** **intertidal to deep water**
- **Alongshore span:** **3-6 miles (5-10 km; minimum)**
  6-12.5 miles (10-20 km; preferred)
- **Spacing:** **31-62 miles (50-100 km)**
- **Replication:** **3-5 replicates**
- **Species:** **include breeding, feeding and resting areas for birds and mammals**